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The Effectiveness Test Application Anthocyanin's Extract in Fruit Jam and Yoghurt From Several Local Biological

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Abstract

The study is to investigate the effectiveness of several anthocyanin on quality of papaya jam and yoghurt. It was conducted using a randomized block design, arranged with two factors. The first factor is the anthocyanins with different source with several levels that of control (without pigment), kana flower, rose flower, grape and skins dragon fruit, factor II is application that pigments in two product.

The results of the study, indicating that there is significant to increase quality products. The best treatment is the addition of the anthocyanin kana flower in papaya jam and the anthocyanin rose flower in yoghurt.

Keywords : Pigment, anthocyanins, local biological, jam, yoghurt

1. Introduction

Papaya is easily damaged by the influence of mechanical, chemical, microbiological and biologically by the extension of shelf life by processing into jams. FDA survey results (2006) from 2002-2005 found violations in the use of food dyes on the second rank (11.31%), and the Ministry of Health of Indonesia (2012) revealed that the use of synthetic food dyes continually can cause damage to the liver.

The use of pigments as a source of natural dyes do not give adverse effects on health. Natural dyes that has potential to be extracted namely, anthocyanin, which is a red, purple and blue pigments are found in

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plants, pigments are widely distributed in plants [1]. The water-soluble pigment, found in flowers, fruits and leaves of plants. These pigments can be applied as an alternative natural dyes in industrial products, such as food, cosmetics and pharmaceuticals [2]. In accordance with the findings of Wu *et. al.* (2009) that the natural coloring product that has excellent stability and can be used in a variety of applications including beverages, foods, drugs, dietary supplements, cosmetics, handicrafts and fodder [3].

According to [4], extracts containing anthocyanins effect of low toxicity. Anthocyanins have the ability as an antioxidant in the body [4]. The previous studies which explored on the biological material found that the petals of kana flower and Probolinggo grapes contain anthocyanin pigments with the highest yield and potential as a natural dye. The skin of dragon fruit has a red pectin content that maximizes the formation of gel texture and can be used as natural dyes [5,6,7].

Nomenclature

A	FDA is Food drug association of
B	Anthocyanin pigment of natural colorant that ...
C	further nomenclature continues down the page inside the text box

2. Research Design

The design used in this study was a Randomized Block Design arranged as factorial, consisting of two factors, the Factor I : the addition of the anthocyanin concentration (2% b / b) with different sources and the Factor II : the addition of sugar to the papaya jam. Factor I consisted of control (no Anthocyanin), pigment red kana flower, Probolinggo grapes and red dragon fruit skin. Factor II : the addition of different glucose levels (40%, 50% and 60%), in order to obtain 12 treatments and each treatment was repeated three times. The results were analyzed using statistical tests (analysis of Duncan's Median Range Test).

3. Material and Methods

3.1. Material

Raw materials include, Thai Papaya obtained from the local farmers of Bululawang. Name Budi Santoso, Jl.Sidomukti 24 Rt.04 / Rw.01 Wandanpuro Village, District Bululawang Malang. Papaya jam processing is done about 3 days after harvest with the maturity level of 75-80%. Type of anthocyanin pigment sources used as a material include red kana flower petals (*Canna indica* L), Probolinggo grape (*Vitis vinifera*), the skin of red dragon fruit (*Hylocereus costaricensis*), commercial sugar or sucrose (white), citric acid, distilled water, commercial pectin, and chemicals for such analysis, silver nitrate, $NaHCO_3$, 1% starch, iodine 0.01 N, 0.05 NaOH 1N HCl, 1N $CaCl_2$, acetic acid and the solution luffschoorl.

3.2. Anthocyanin Extraction Procedure

Materials were weighed, crushed in a blender added with distilled water solvent acid (citric acid 10% b/v), let stand for 24 hours in cold temperatures. Subsequently centrifuged for 10 minutes (speed 4000

rpm) to separate the filtrate and the residue was filtered using Whatman No.41 paper. The obtained filtrate was evaporated using a rotary vacuum evaporator at 50 ° C , 1/5 of its original volume.

3.3. Papaya Jam Making Procedures

Papaya flesh were crushed without the addition of water in a blender until soft. Weighed as much as 100 g porridge and boiled for 10 minutes. Then the sugar added according to treatment 40% b/b, 50% b/b and 60% b/b, commercial pectin 0.75% b/b on the 8th minute, continue heating until a total time of 10 minutes. Butter was derived from the appropriate fire and added by anthocyanin. It mixed until homogeneous and which have been packaged in a sterile cup.

4. Data and Findings

4.1. Analysis of Raw Materials

The results of the analysis of the highest total sugar content in grapes that is 28.46%, followed by the dragon fruit ranges from 13-18%, the kana petals 15.42% and the lowest total sugar in papaya fruit flesh 13.08%. The presence of total sugar content in the raw material source shows indications of the presence of anthocyanin compounds glikon, which is one of the characters from the pigment anthocyanin, which consists of the aglycone (as antosianindin) and glikon as sugar compounds bound glycosidic bond [5,8,9]. Pectin content at 4.25% black grapes, red dragon fruit skin was 15.70% and 1.34% of papaya fruit flesh. Pectin content of the material can help maximize the existence of gel that is formed in papaya and improve the spearing [10].

Table 1: Results of Chemical Analysis of Raw Material Sources Anthocyanin pigments and Thai Papaya

Chemical Analysis	Red Kana	Grape	Red Dragon Fruit	Thai Papaya
Water content (%)	85.36	88.35	83.50	90.54
Total of sugar (%)	15.42	28.46	13-18	13.08[11]
Vitamin C (mg/100g)	0.67	0.97	8.0-9.4%	330.00
Pectin (%)	-	4.25[12]	15.70[13]	1.34
Reducing sugar (%)	-	-	-	2.42
pH	-	-	-	4.65

Papaya pulp color intensity indicates the presence of carotenoid pigments that give the appearance of a red color yellowish or orange. At the level of brightness (L) 37.9, redness (a+) value of 10.27, and the degree of yellowness (b+) 11.57. Orange red pigment caused by carotenoids that are soluble in oil. Ripe papaya superior in terms of beta-carotene (276 micrograms / 100 g) [10].

Kana flower anthocyanin absorbance value 0.585 (A0), 0,367 grapes (A0) and dragon fruit skin 0.449 (A0) (at λ 510-540 (A0) pengenceran100x. Research results from [5], that the red kana flower indicates the type of anthocyanin peralgonidin 3-glucoside, sianidin 3-glucoside, in Probolinggo grape contains anthocyanin types malvidin 3 glycosides and on the skin red flesh dragon fruit contain anthocyanin pigments namely, *sianidin* 3-glucoside 5-glucoside

4.2. Color Intensity

Based on the analysis of variance no interaction between the addition of the anthocyanin and sugar levels to the brightness, reddish and yellowish or bluish of papaya jam, but separately the two significant factors. The level of brightness (L) (Table 8) papaya due to the addition of the highest concentration of anthocyanins in the with the addition of the dragon fruit skin anthocyanin 31.84, 31.51 grape anthocyanin, then the control treatment and the lowest 31.16 30.81 kana flower anthocyanin. The lower the brightness level of papaya jam, it means that the product has a solid red, indicating anthocyanin pigment concentrates kana flower is more stable than the skin of grapes and dragon fruit. Red kana flower containing anthocyanin pigments that most in grape by 0.91%, 0.15% and dragon fruit skin anthocyanin 0.02% [5,7].

Table 2 The intensity of the color (L, a, b) of Vdue to the addition of Anthocyanins and Sugar Content

Treatments	Lightness (L)		Redness (a^+)	Yellowness/ blueness/ ($b^{+/-}$)
Control (Without pigment)	31.16	b	1.69 a	0.27 b
Red Kana	30.81	A	2.88 d	-0.26 a
Grape Fruit	31.51	C	2.32 c	0.28 bc
Skin of Red Dragon fruit	31.84	d	2.02 b	0.37 d
Level of sugar 40%	10.55	C	0.79 c	0.12 b
Level of sugar 50%	10.50	b	0.77 b	0.12 bc
Level of sugar 60%	10.28	A	0.67 a	-0.08 a

Remarks: The figures followed by the same letter indicates not significant at the Duncan test 5%.

The highest brightness level on addition of sugar at 40% that is 10.55, followed by sugar at 50% (10.5), sugar 60% at 10.28. The increasing of additional sugar showed a decrease in the value of brightness (L). This is expected because warming accounted sugar brown pigment due to browning (caramelization), as some polyphenols others [23]. Besides that, the highest level of redness with the addition of anthocyanin flowers kana at 2.88, followed by 2.32 and grape anthocyanins dragon fruit skin 2.02, while the lowest level of redness on anthocyanin treatment without (control). The highest value a+ of papaya fruit with the addition of kana flower anthocyanin supported by the results of the analysis of pH, where the pH value of papaya low of 3.94, so as to improve color stability. As stated by [24], anthocyanin pigments stable at acidic pH ranged between 1-4 and will give a red color as anthocyanin which physical characteristics.

The level of redness (a+) of papaya jam due to the addition of sugar at 40% by 0.79, addition of sugars at, 50% by 0.77 and addition of sugars at 60% by 0.67. The decreasing of a+ is because the nature of the sugar that is slightly acidic which can raise the pH value. The level of redness will decrease along

with the addition of sugar. The existence of glucose, fructose and ascorbic acid can simultaneously accelerate the degradation of anthocyanins [25].

The highest level of yellowness value on papaya with the addition of dragon fruit skin anthocyanin as many as 0,367, then control treatment by 0,267, grape anthocyanin by 0.278, while the papaya with the addition of flower pigments kana into b-(-0.26) bluish color (purplish red). This is influenced by the high and low yield of anthocyanin that affect the stability of anthocyanin time of application, kana flower has the highest yield of 0.91%, followed by grapes 0.15% and dragon fruit skin by 0.07% [5]. Degree of yellowness value (b+) have the same relative value is 0.122, the addition of sugars 40 and 50%, whereas the addition of 60% sugar papaya has a bluish rate of -0.081. The existence of sugar causes changes in the structure of different types of anthocyanins, the sign (-) indicates the level of physical appearance means bluish purplish red.

The addition of sugar to lower levels of yellowish and bluish on anthocyanin pigment. As a result of the preliminary test that anthocyanin pigments of kana flower has a bluish-level at -1.0, and grapes at -0.55 (higher than the results of the analysis after application of -0.081) and yellowish level at 0.35 (higher than the results of the analysis after application 0.122).

4.3. Organoleptic Analysis on Papaya Jam (Taste, Appearance and Aroma)

From the mean value of the highest known level of preference in the addition of sugar at 60% and anthocyanin pigments kana flower (G3A1) and the lowest preference level at 50% added sugar without the addition of anthocyanin pigments (G2A0). Sugars and pigments provide an acceptable flavor ombinasi consumers. Sweet and sour flavor that carried by anthocyanin pigments from the use of citric acid as the solvent as much as 10% b/v, like research results [18], the higher the concentration of citric acid is added very significant effect on the taste of the panelists acceptance. Sour taste of citric acid influence the assessment of the panelists on attributes of taste which is generally deserved by consumer as sweet-sour taste.

Table 3. The mean Ranking Taste from thePanelist on papaya jam due to Addition of Sugar and Anthocyanin Interactions

Treatment	Taste		Appearance		Aroma	
Without anthocyanin, Sugar 40%	-0,60	ab	-1,29	a	-0,83	a
Anthocyanins kana flower, Sugar 40%	-0,35	abcd	1,21	j	-0,44	abcd
Grape anthocyanins, Sugar 40%	-0,15	abcde	-0,31	de	0,11	defg
Dragon fruit skin anthocyanin, Sugar 40%	-0,04	bcdefg	-0,73	bc	-0,25	cde
Without anthocyanin, Sugar 50%	-0,65	a	-0,97	b	-0,82	ab
Anthocyanins kana flower, Sugar 50%	0,10	defgh	0,93	j	0,14	efgh
Grape anthocyanin, Sugar 50%	0,31	defghi	-0,19	def	0,63	hi
Dragon fruit skin anthocyanin, Sugar 50%	-0,11	abcdef	-0,46	cd	-0,13	cdef
Without anthocyanin, Sugar 60%	-0,54	abc	0,14	fg	-0,68	abc
Anthocyanins kana flower, Sugar 60%	0,96	j	1,06	j	0,96	i
Grape anthocyanins, Sugar 60%	0,65	ij	0,41	ghi	0,85	i
Dragon fruit skin anthocyanin, Sugar 60%	0,43	efghij	0,21	fgh	0,67	hi

Remarks: The figures followed by the same letter indicates not significant at the Duncan test 5%.

The level of consumer acceptance of papaya highest appearance on anthocyanin pigment enhancer in combination with sugar flower kana respectively 40%, 50% and 60%. In the next rank followed by the addition of anthocyanin pigments papaya grapes and dragon fruit leather with the addition of 60% sugar. In the results indicate a papaya color darker colors with higher addition of sugar and the red with the

addition of pigment anthocyanin especially kana flower. The addition of sugar gives a contribution on darker color (brown) due to the caramelization process during processing [23], while the red pigment antosinain give the red color on the jam. This color combination raises its own interest for the panelists.

In addition to the appearance of the color papaya is also supported by the formation of a gel. Gel is formed and maintained because of its existence due to the addition of sugar and acid pH properties which brought by the anthocyanin pigment. The more levels of sugar, the more perfect gel formation is. It is proven by an average value on appearance preferred by the panelists on the provision of sugar at 40% and the lowest rank is on none addition of anthocyanin pigments which have compared to the addition of sugar at 50% and 60% were added with anthocyanin.

Score rank on aroma of papaya products showed a high level level of consumer acceptance on papaya with the addition of more sugar at 60% and the addition of the anthocyanin pigments of flowers kana. The panelists Acceptance to the products indicated by the lowest ranking by the addition of 40% sugar and without the addition of anthocyanin. It has been predicted because of the aroma generated by sugar and anthocyanin pigments which give the acidic nature of the jam by the distinctive aroma of papaya fruit that give the collaborative sensations and make the panelis interested. It is proven that the addition of high levels of sugar in the and the addition of pigments provide a high level of preference. The aroma of sugar formed during burning process of caramelization. Along with the caramelization process, the browning reaction or brownish yellow color will be formed [24,6].

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CERTIFICATE OF PARTICIPATION

This is to certify that

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